

Name: _____ Period: _____ Score: _____

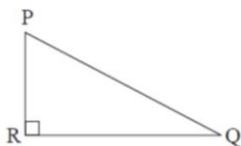
Student must show all work on a separate piece of paper in order to earn full credit.

Section 1: Understanding Pythagorean Theorem

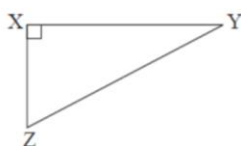
Exercises

1. Which side is the *hypotenuse* in each of the following right angled triangles:

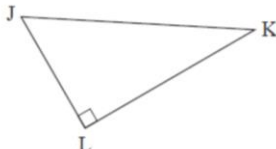
(a)



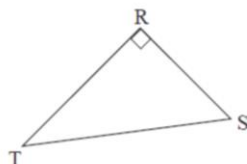
(b)



(c)



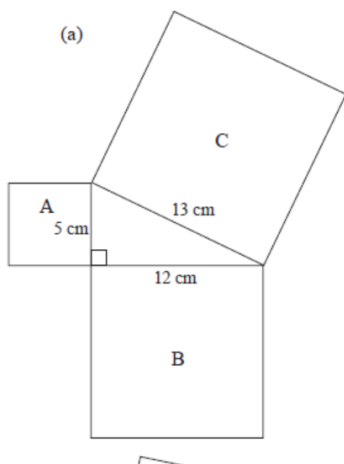
(d)



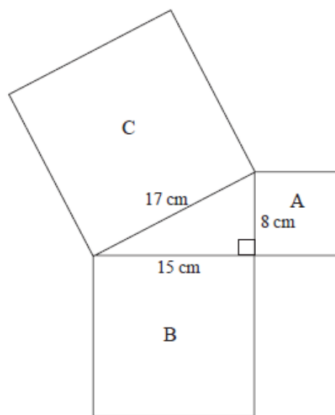
2. For each of the three diagrams at the top of the next page:

- calculate the area of square A,
- calculate the area of square B,
- calculate the sum of area A and area B,
- calculate the area of square C,
- check that :
 $\text{area A} + \text{area B} = \text{area C}$

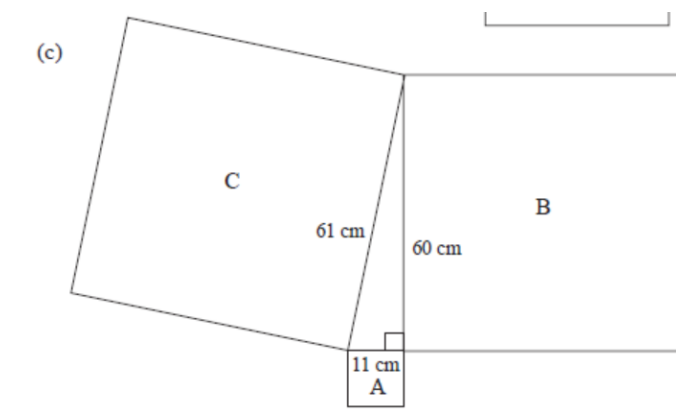
(a)



(b)

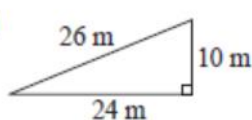


(c)

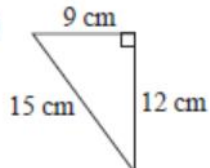


3. Using the method shown in Example 1, verify Pythagoras' Theorem for the right-angled triangles below:

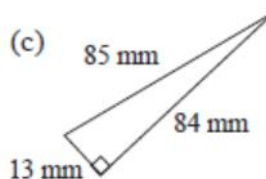
(a)



(b)



(c)



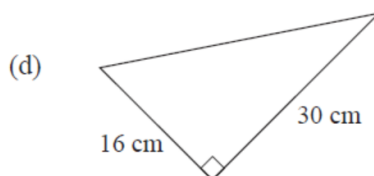
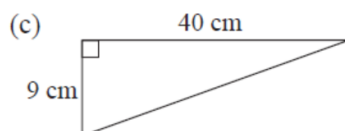
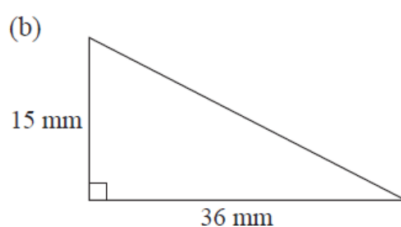
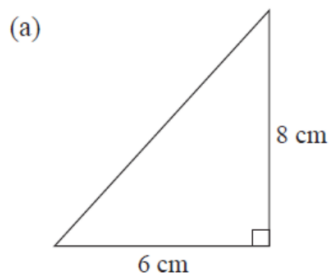
4. The whole numbers 3, 4, 5 are called a *Pythagorean triple* because $3^2 + 4^2 = 5^2$. A triangle with sides of lengths 3 cm, 4 cm and 5 cm is right-angled.

Use Pythagoras' Theorem to determine which of the sets of numbers below are Pythagorean triples:

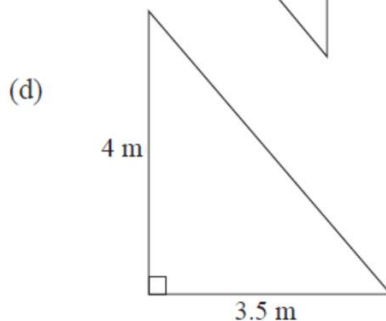
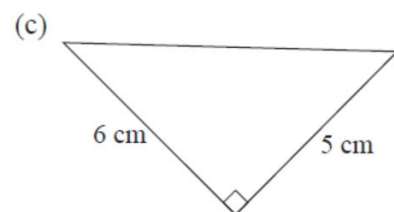
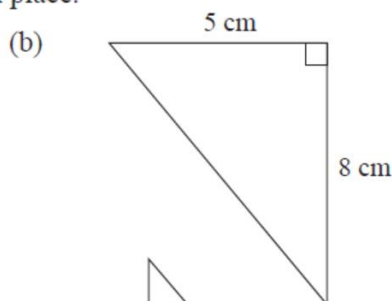
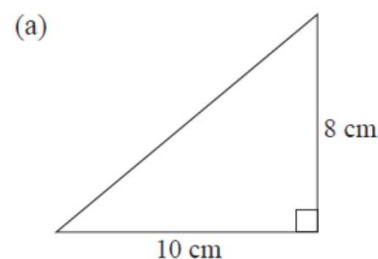
- (a) 15, 20, 25 (b) 10, 24, 26
(c) 11, 22, 30 (d) 6, 8, 9

Section 2: Calculating the hypotenuse

1. Calculate the length of the hypotenuse of each of these triangles:



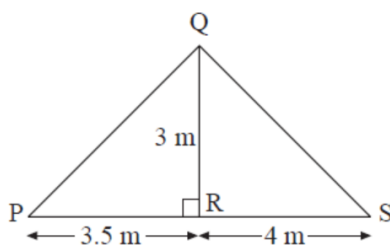
2. Calculate the length of the hypotenuse of each of the following triangles, giving your answers correct to 1 decimal place.



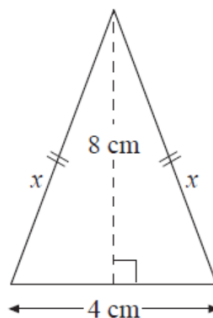
3. A rectangle has sides of lengths 5 cm and 10 cm.
How long is the diagonal of the rectangle?
4. Calculate the length of the diagonal of a square with sides of length 6 cm.

5. The diagram shows a wooden frame that is to be part of the roof of a house:

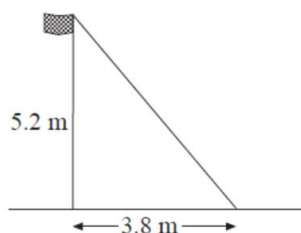
- Use Pythagoras' Theorem in triangle PQR to find the length PQ.
- Calculate the length QS.
- Calculate the total length of wood needed to make the frame.



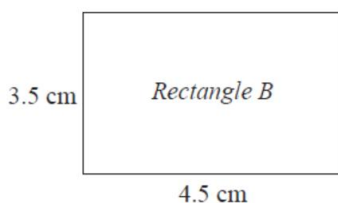
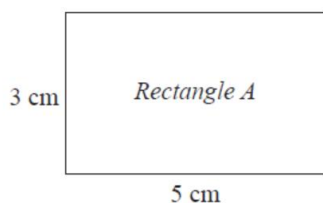
6. An isosceles triangle has a base of length 4 cm and perpendicular height 8 cm. Giving your answers correct to 1 decimal place, calculate:
- the length, x cm, of one of the equal sides,
 - the perimeter of the triangle.



7. One end of a rope is tied to the top of a vertical flagpole of height 5.2 m. When the rope is pulled tight, the other end is on the ground 3.8 m from the base of the flagpole. Calculate the length of the rope, giving your answer correct to 1 decimal place.

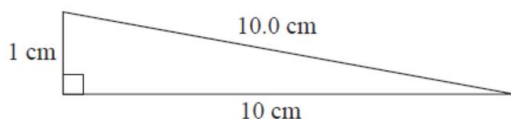


8. A rectangular lawn is 12.5 m long and 8 m wide. Matthew walks diagonally across the lawn from one corner to the other. He returns to the first corner by walking round the edge of the lawn. How much further does he walk on his return journey?
9. Which of the rectangles below has the longer diagonal?



- 10.

- Use Pythagoras' Theorem to show that the length of the hypotenuse of this triangle is 10.0 cm correct to 1 decimal place.
- Maxine says that this triangle is isosceles because there are two sides of the same length.

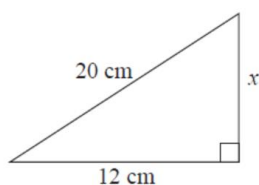


Is Maxine correct?

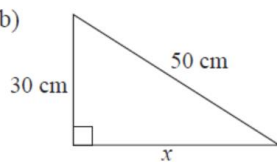
Section 3: Calculating the length of the side (leg)

1. Calculate the length of the side marked x in each of the following triangles:

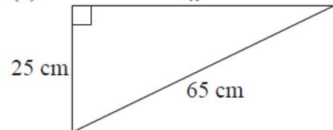
(a)



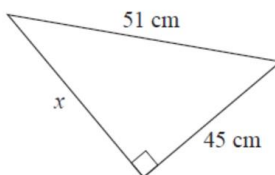
(b)



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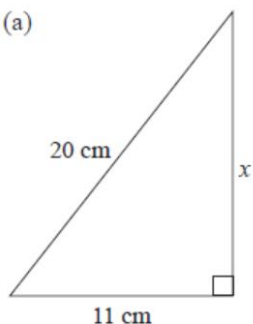


(d)

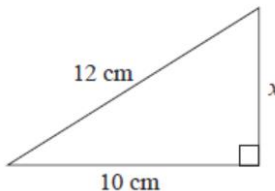


2. Calculate the length of the side marked x in each of the following triangles, giving your answer correct to 1 decimal place:

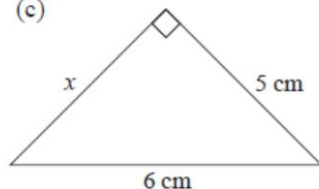
(a)



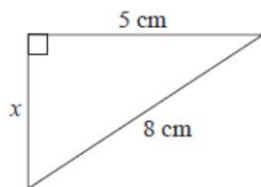
(b)



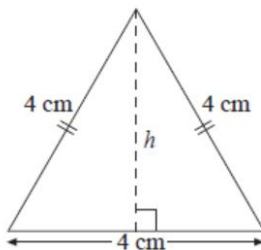
(c)



(d)

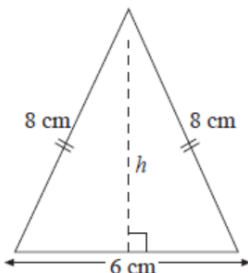


3. Calculate the perpendicular height of this equilateral triangle, giving your answer correct to 1 decimal place.



4. Calculate the perpendicular height of an equilateral triangle with sides of length 5 cm, giving your answer correct to 1 decimal place.

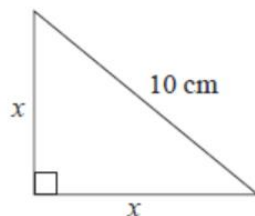
5. Calculate the perpendicular height of the isosceles triangle shown opposite, giving your answer correct to 1 decimal place.



6. The width of a rectangle is 5 cm and the length of its diagonal is 13 cm.

- (a) How long is the other side of the rectangle?
(b) What is the area of the rectangle?

7. The isosceles triangle at the top of the next page has 2 sides of length x cm. Copy and complete the calculation to find the value of x correct to 1 decimal place.



By Pythagoras' Theorem,

$$x^2 + x^2 = 10^2$$

$$2x^2 = 100$$

$$x^2 =$$

$$x = \sqrt{\quad}$$

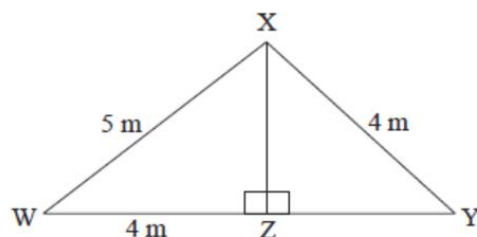
$$x =$$

$$x = \quad \text{to 1 decimal place.}$$

8. The length of the diagonal of a square is 8 cm. How long are the sides of the square?

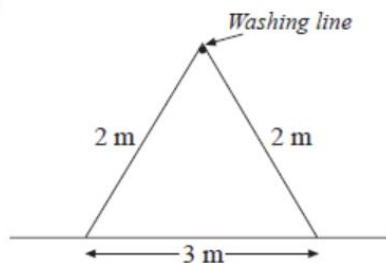
9. The diagram shows part of the framework of a roof.

- (a) Calculate the length XZ.
(b) Calculate the length of YZ, correct to 1 decimal place.



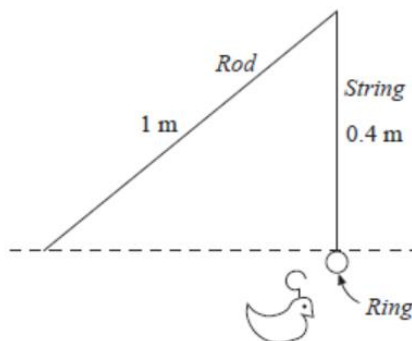
10. A sheet is stretched over a washing line to make a tent, as shown in the diagram.

- (a) How high is the washing line above the ground? Give your answer to 1 decimal place.
(b) If the same sheet was used and the washing line was now at a height of 1.25 m above the ground, what would be the width of the base of the tent? Give your answer correct to 1 decimal place.



11. A fishing rod is used to catch plastic ducks in a fairground game. The rod is 1 m long. A string with a ring is tied to the end of the rod. The length of the string is 0.4 m.

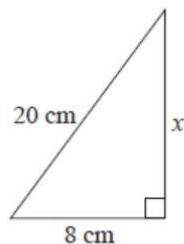
When the ring is level with the lower end of the rod, as shown in the diagram, how far is the ring from that end of the fishing rod?



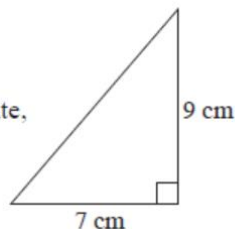
Section 4: Problem in context

1. A hiker walks 300 m due north and then 400 m due east. How far is the hiker now from her starting position?
2. A ladder of length 4 m leans against a wall so that the top of the ladder is 3 m above ground level. How far is the bottom of the ladder from the wall?
3. Two remote-controlled cars set off from the same position. After a short time one has travelled 20 m due north and the other 15 m due east. How far apart are the two cars?
4. A room should have a rectangular floor, with sides of lengths 4 m and 5 m. A builder wants to check that the room is a perfect rectangle and measures the two diagonals of the room, which should be the same length. To the nearest cm, how long should each diagonal be?

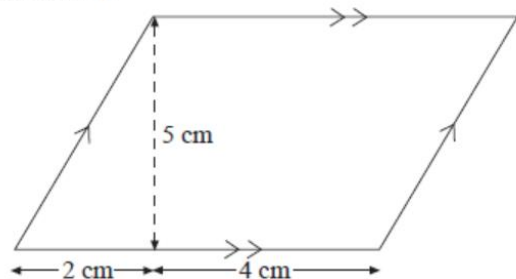
5. For the triangle shown opposite,
 - (a) calculate the length x ,
 - (b) calculate the area of the triangle.



6. Calculate the perimeter of the triangle shown opposite, giving your answer correct to 1 decimal place.



7. Calculate the perimeter of the parallelogram below, giving your answer to the nearest millimetre.



8. One end of a rope of length 10 m is tied to the top of a vertical flag pole. When the rope is tight it can touch the ground at a distance of 4 m from the base of the pole. How tall is the flagpole? Give your answer correct to the nearest cm.
9. A guy rope on a tent is 1.5 m long. One end is fixed to the top of a vertical pole and the other is pegged to the ground. If the pole is 1.2 m high, how far is the pegged end of the rope from the base of the flagpole?
10. Ron's dad says that Ron must not walk on the lawn. The lawn is a rectangle with sides of lengths 10 m and 16 m. When his dad is looking, Ron walks from his house to the gate by walking along two edges of the lawn. When his dad is not looking, Ron walks diagonally across the lawn.
How much further does Ron have to walk to get from the house to the gate when his dad is looking? Give your answer to a suitable level of accuracy.